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**Report of the individual review of the greenhouse gas inventories of
the Netherlands submitted in 2007 and 2008***

* In the symbol for this document, 2008 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Overview

A. Introduction

1. This report covers the centralized review of the 2007 and 2008 greenhouse gas (GHG) inventory submissions of the Netherlands, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. In accordance with the conclusions of the twenty-seventh session of the Subsidiary Body for Implementation the focus of the review is on the most recent 2008 submission.¹ The review took place from 1 to 6 September 2008 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Ms. Barbara Muik (Austria) and Ms. Kristina Saarinen (Finland); energy – Ms. Maria Liden (Sweden) and Mr. Christo Christov (Bulgaria); industrial processes – Ms. Karin Kindbom (Sweden) and Ms. Sina Wartmann (Germany); agriculture – Ms. Anna Romanovskaya (Russian Federation) and Ms. Fatou Gaye (Gambia); land use, land-use change and forestry (LULUCF) – Mr. Rizaldi Boer (Indonesia) and Mr Giacomo Grassi (Italy); and waste – Ms. Medea Inashvili (Georgia) and Mr. Faouzi Senhaji (Morocco). Ms. Anna Romanovskaya and Mr. Faouzi Senhaji were the lead reviewers. The review was coordinated by Mr. Matthew Dudley (UNFCCC secretariat).

2. In accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1), a draft version of this report was communicated to the Government of the Netherlands, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Inventory submission and other sources of information

3. The 2008 annual inventory was submitted on 15 April 2008; it contains a complete set of common reporting format (CRF) tables for the period 1990–2006 and a national inventory report (NIR). This is in line with decision 15/CMP.1. The Netherlands resubmitted its CRF tables on 26 May 2008 that was used for the basis of this review. The Party indicated that the 2008 submission is also its voluntary submission under the Kyoto Protocol which included in the Annex to the NIR the supplementary information required under Article 7 of the Kyoto Protocol.² In its 2007 submission, the Netherlands included a complete set of CRF tables for the period 1990–2005 and an NIR. Where needed the expert review team (ERT) also used additional information provided during the review, including information on the completeness of the inventory provided to the ERT by the Party, and other information.

C. Emission profiles and trends

4. In 2006 (as reported in the 2008 annual inventory submission), the main GHG in the Netherlands was carbon dioxide (CO₂), accounting for 83.0 per cent of total GHG emissions³ expressed in CO₂ eq, followed by nitrous oxide (N₂O) (8.2 per cent), and methane (CH₄), (7.8 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) collectively accounted for 1.0 per cent of the overall GHG emissions in the country. The energy sector accounted for 80.5 per cent of the total GHG emissions, followed by agriculture (8.8 per cent), industrial processes (7.5 per cent), waste (3.1 per cent) and solvents and other product use (0.1 per cent). Total GHG emissions amounted to

¹ FCCC/SBI/2007/34, paragraph 104.

² Parties may start reporting information under Article 7, paragraph 1, of the Kyoto Protocol from the year following the submission of the initial report, on a voluntary basis (decision 15/CMP.1).

³ In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO₂ eq excluding LULUCF, unless otherwise specified.

207,476.60 Gg CO₂ eq and decreased by 2.6 per cent between the base year⁴ and 2006. In 2005 (as contained in the 2007 inventory submission), total GHG emissions amounted to 212,134.12 Gg CO₂ eq. The shares of gases and sectors in 2006 (2008 annual inventory submission) were similar to those of 2005 (2007 inventory submission).

5. Tables 1 and 2 show GHG emissions by gas and by sector, respectively.

D. Key categories

6. The Netherlands has reported key category tier 1 and tier 2 analyses, both level and trend assessment, as part of its 2008 submission. The tier 1 key category analysis performed by the Party and that performed by the secretariat⁵ produced similar results. The Netherlands has included the LULUCF sector in its key category analysis, which was performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The following key categories were identified in the 2008 submission but not in the 2007 submission: road transportation – N₂O, navigation – CO₂, other (2.A.7) – CO₂ and land converted to forest land – CO₂, and the following key category was identified in the 2007 submission but not in the 2008 submission: indirect emissions (4.D.3) – N₂O. The Netherlands reported additional key categories that were identified in the tier 2 analysis: road vehicles – N₂O, stationary combustion – CH₄, and manure management (poultry) – CH₄. According to the Party, the changes in key categories in the tier 2 analysis are the result of recalculated emissions and updated uncertainties.

7. The Netherlands has used the key category analysis to prioritize the improvement of its inventory, by choosing appropriate methodologies, performing recalculations where applicable and developing a more thorough uncertainty assessment.

8. The ERT reiterates the recommendation from the previous expert review on the reporting of its key category analysis in the NIR and the need to clearly identify the analysis that includes LULUCF, and requests that the Netherlands resolve this in its next annual submission.

⁴ Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

⁵ The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

Table 1. Greenhouse gas emissions by gas, 1990–2006

Greenhouse gas emissions	Gg CO ₂ eq								Change base year–2006 (%)
	Base year ^a	1990	1995	2000	2003	2004	2005	2006	
CO ₂	159 355.83	159 355.83	170 639.56	169 648.52	179 687.50	181 090.79	175 925.89	172 219.25	8.1
CH ₄	25 437.71	25 437.71	23 773.69	19 229.81	17 545.82	17 252.00	16 844.92	16 282.81	–36.0
N ₂ O	19 943.45	19 943.45	21 308.47	19 027.17	16 819.01	17 341.05	17 114.70	16 943.51	–15.0
HFCs	6 019.54	4 432.03	6 019.54	3 823.57	1 378.68	1 510.51	1 352.70	1 559.41	–74.1
PFCs	1 937.82	2 264.48	1 937.82	1 581.54	620.53	285.64	266.20	256.54	–86.8
SF ₆	301.26	217.32	301.26	319.83	247.60	251.28	249.83	215.08	–28.6

Abbreviation: NA = not applicable.

^a Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

Table 2. Greenhouse gas emissions by sector, 1990–2006

Sectors	Gg CO ₂ eq								Change base year–2006 (%)
	Base year ^a	1990	1995	2000	2003	2004	2005	2006	
Energy	154 005.05	154 005.05	165 522.15	164 282.07	174 800.06	176 088.33	170 953.63	167 085.34	8.5
Industrial processes	23 536.22	22 191.44	23 559.97	20 247.53	15 468.46	15 883.70	15 543.55	15 659.65	–33.5
Solvent and other product use	541.18	541.18	439.85	306.89	233.82	220.91	213.41	216.09	–60.1
Agriculture	22 097.77	22 097.77	23 138.69	19 923.12	18 290.87	18 325.92	18 281.05	18 183.47	–17.7
LULUCF	NA	2 667.30	2 465.16	2 668.58	2 618.52	2 598.14	2 580.93	2 574.36	NA
Waste	12 815.39	12 815.39	11 319.67	8 870.84	7 505.93	7 212.39	6 762.59	6 332.04	–50.6
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	214 318.12	226 445.49	216 299.03	218 917.66	220 329.40	214 335.16	210 050.97	NA
Total (without LULUCF)	212 995.61	211 650.82	223 980.33	213 630.44	216 299.14	217 731.26	211 754.23	207 476.60	–2.6

Abbreviations: LULUCF = land use, land-use change and forestry; NA = not applicable.

^a Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year emissions do not include any possible emissions from deforestation; however, if applicable, these are taken into account when the assigned amount is calculated.

E. Main findings

9. The Netherlands inventory is generally prepared in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT found that the inventory is generally complete, covers all sectors, most categories, and all years of the inventory time series, and provides full geographic coverage.⁶ The ERT found that the Netherlands inventory is generally transparent; however, the ERT identified areas for improvement with respect to the reporting of activity data (industrial processes, agriculture, LULUCF) (AD), emission factors (EFs) and methodology (agriculture), and confidential data (industrial processes).

10. The ERT identified instances of potential underestimations that were raised with the Party during the review, and subsequently explained by the Party (see para. 11 below).

F. Cross-cutting issues

1. Completeness

11. The inventory is generally complete in terms of years and geographic coverage and covers all gases and most categories. Some minor categories are reported as 'not estimated' (NE) by the Party due to a lack of AD or EFs (see paras. 26 and 36 below) even though the activity is known to occur in the country. In response to the ERT, the Netherlands indicated that it will improve the completeness of the inventory in its next annual submission. The ERT reiterates the recommendation from the previous expert review regarding improvement of the completeness of the inventory, and requests that the Netherlands resolve this problem and report thereon in its next annual submission.

12. The CRF tables are generally complete; however, some gaps have been identified in the reporting, including in the sectoral background data tables (e.g. agriculture). The ERT recommends that the Netherlands improve the completeness of the CRF submission in its next annual submission.

2. Transparency

13. The NIR has been prepared generally in accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines). However, the ERT has identified a number of areas that could be improved, including: reporting of information in the NIR on the national monitoring protocols⁷, methodologies, AD, EFs, parameters and other information to allow the ERT to reproduce the inventory, and providing more detailed documentation on the underlying assumptions of the uncertainty analysis (see para. 17 below). The ERT reiterates the recommendation from the previous expert review regarding the need for greater transparency of the inventory, and requests that the Netherlands include all relevant information in the NIR to allow for expert review and reproduction of the inventory.

14. The ERT concluded that the reporting of confidential data by the Party (mainly in the industrial processes sector) prevented the ERT from determining whether emission estimates have been prepared in

⁶ In ratifying the Kyoto Protocol, the Netherlands declared that the ratification relates to its territories in Europe. Accordingly, the GHG inventory of the Netherlands does not cover Dutch territories outside Europe.

⁷ The monitoring protocols describe methods and working processes for estimating the emissions, AD and EFs for most categories of the Netherlands inventory. A set of about 40 monitoring protocols have been prepared and are published by the Ministry of Housing, Spatial Planning and Environmental Management (VROM) as part of a ministerial decision on greenhouse emissions inventory <www.greenhousegases.nl>.

line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. The ERT recommends that the Party explore ways to improve the transparency of confidential emission estimates.

3. Recalculations and time-series consistency

15. The ERT noted that recalculations reported by the Party of the time series from 1990 to 2005 have been undertaken. The rationale for these recalculations is provided in both the NIR and the CRF. However, the Party informed the ERT that the 2007 annual submission was not updated to reflect changes arising from the initial review completed in late 2007. The ERT found that the reported recalculations in the 2008 submission were undertaken: in response to recommendations of the previous expert review; on the basis of general inventory improvement (some minor corrections); and improvements that were made to the AD. The ERT concluded that the inventory is generally time-series consistent.

4. Uncertainties

16. The Netherlands reported an IPCC tier 1 uncertainty analysis for both the 2007 and 2008 submissions, with the results presented both at the summary level and at the individual category level. Both submissions also provided information on the IPCC tier 2 uncertainty analysis that was performed in 2006. Results show that the tier 2 uncertainty for total GHG emissions is in the same order of magnitude as the corresponding tier 1 uncertainty analysis, but the tier 2 analysis showed a higher uncertainty in the trend.

17. The ERT noted that the Netherlands has provided in the NIR sector chapters information on uncertainties. This information indicates that the derivation of uncertainty is generally based on expert judgment, with the NIR providing a reference to an unpublished background document. The ERT recommends that the Netherlands include the basic assumptions underpinning the uncertainty analysis in the NIR, and publish the aforementioned background document, or include it in the annex to the NIR. The ERT encourages the Party to verify its uncertainty estimates by seeking input to uncertainty analysis directly from data providers (e.g. facilities that report emissions for the industrial processes sector, statistical bureaux, etc.).

5. Verification and quality assurance/quality control approaches

18. The Netherlands has a quality assurance/quality control (QA/QC) plan in place, in accordance with the IPCC good practice guidance, that is reviewed annually and updated as needed. The NIR includes general information on QA/QC procedures. The Netherlands has implemented a recommendation made during the previous expert review to include descriptions of source/sink category-specific QA/QC procedures (tier 2) in the sector sections of the NIR. The ERT encourages the Netherlands to extend these descriptions to all key categories and to other categories for which major methodological and/or data changes have occurred.

19. The ERT noted that QA/QC procedures are not always implemented according to their descriptions in the NIR. For example, the ERT identified the following inconsistencies: between information provided in the NIR when compared to information in the national monitoring protocols (industrial processes); a lack of updated information on AD for the years 2004–2006, in both the NIR and the national monitoring protocols (all sectors); inconsistencies between the information provided in the NIR and CRF (agriculture); and a lack of an updated CRF table for the 1990 key category analysis. The ERT recommends that the Netherlands implement its QA/QC procedures in accordance with the QA/QC plan at each stage of the inventory preparation.

6. Follow-up to previous reviews

20. Recommendations from the previous expert review have been implemented by the Party, namely in the provision of information in the NIR on sector specific QA/QC procedures, and the Party also

reported several recalculations of the inventory time series in response to problems identified by the previous expert review (e.g. industrial processes, agriculture).

21. The Netherlands has not yet implemented recommendations made during the previous expert review with respect to:

- (a) The reporting of additional information in the CRF table for agriculture;
- (b) The improvement of the land-use change matrix in the LULUCF time series, and other related issues;
- (c) The exclusion of heather (calunna) in the forest land category (i.e. inconsistent with forest definition);
- (d) The resolution of inconsistent reporting between the NIR and the CRF of the oxidation factor and the fraction of CH₄ in landfill gas.

G. Areas for further improvement

1. Identified by the Party

22. The 2008 NIR identified several areas for improvement. In response to issues raised in the previous expert review, the Netherlands indicated that it is working to improve its inventory. Areas of improvement include:

- (a) The re-evaluation of the completeness of the inventory;
- (b) The re-assessment of the basic data on deforestation;
- (c) The improvement of the transparency of the inventory by including in the NIR more detailed information from the national monitoring protocols and background reports;
- (d) Further centralization of the archiving system.

2. Identified by the expert review team

23. The ERT identifies the following cross-cutting issues for improvement:

- (a) The improvement of the consistency of information reported in the NIR when compared to the detail of information provided in the national monitoring protocols, ensuring that this information is up-to-date, thus allowing the ERT to reproduce the inventory;
- (b) Further improvement of the transparency of the inventory with a specific focus on the reporting of confidential emissions, AD, EFs and methodology;
- (c) The improvement of the completeness of the inventory;
- (d) The consistent reporting of emissions from deforestation in the CRF tables;
- (e) Further improvement of the description of category-specific QA/QC activities in the NIR to cover all key categories;
- (f) The expansion of QC procedures to identify inconsistencies in reporting;
- (g) The improvement of the reporting of the key category analysis in the NIR, by clearly differentiating the output of the analysis with and without LULUCF;
- (h) Further centralization of the archiving system.

24. Recommended improvements relating to specific source/sink categories are presented in the relevant sector chapters of this report.

II. Energy

A. Sector overview

25. In 2006, the energy sector accounted for 80.5 per cent (167,085.34 Gg CO₂ eq) of total GHG emissions. Emissions from this sector decreased by 2.3 per cent between 2005 and 2006, and increased by 8.5 per cent between the base year and 2006. The key drivers for the trend between the base year and 2006 are the 18.2 per cent (9,584.03 Gg CO₂ eq) increase in emissions from energy industries, and the 36.7 per cent (9,708.18 Gg CO₂ eq) increase over the same time period in the transport sector. Energy industries was the major category in 2006, contributing 37.3 per cent to total sector emissions, while other sectors (1.A.4), transport, manufacturing industries and construction, and fugitive emissions from fuels contributed 23.0, 21.6, 16.5 and 1.3 per cent, respectively, to total sector emissions. CO₂ is the dominant GHG, contributing 99.2 per cent to total sector emissions, while CH₄ and N₂O contribute 0.4 and 0.5 per cent, respectively.

26. The energy inventory is generally complete; however, the ERT identified a number of categories reported as NE: biomass emissions from transport; charcoal use in other sectors; CH₄ emissions from charcoal production (1.B.2); and CO₂ and CH₄ emissions from transport (1.B.2.a.iii). The ERT recommends that the Netherlands explore how to resolve the issue of the completeness of the energy inventory and report thereon in its next annual submission.

27. There are only minor differences between the 2007 and 2008 annual inventory submissions. In the 2008 submission, recalculations have been performed for waste combustion in energy industries in response to a recommendation of the previous expert review, resulting in an increase in N₂O emissions for all years, and rectifying rounding errors of emissions data for waste combustion. An error concerning carbon stored in the reference approach in 2005 has also been corrected in the 2008 submission. Recalculations have been performed in this sector in accordance with the IPCC good practice guidance.

28. The ERT noted that the Netherlands has estimated emissions for key categories using higher tier methods, in line with the IPCC good practice guidance, and that these methods have been described in the NIR. QA/QC procedures have been used throughout the inventory and have been briefly described in the NIR. Uncertainties have been estimated. The Netherlands is encouraged to improve the transparency of the energy inventory by expanding the sections on methodological issues in the NIR (i.e. 3.3.2 and similar sections) and by providing more information on methodologies (technical details), data sources and country-specific allocation issues. These improvements would minimize the need to refer the reader to the national inventory website for further information.

29. The Netherlands has identified the following areas for further improvement: evaluating the present allocation method for reporting CO₂ emissions from refineries in order to ensure complete reporting of CO₂ emissions from 2002 onwards; increasing the use of plant-specific CO₂ EFs for industries; and revising the aggregated EFs for the period 1991–1994 to be congruent with the reported fuel mix in the period 1990–1995. The ERT encourages the Party to report on the resolution of these issues in its next annual submission.

B. Reference and sectoral approaches

1. Comparison of the reference approach with the sectoral approach and international statistics

30. CO₂ emissions are generally higher in the reference approach when compared to the sectoral approach; the period 1991–1995 is the exception, whereby the CO₂ emissions from the sectoral approach are about 8 per cent lower than those from the reference approach. The differences are greater than

2 per cent for the period 1990–1997 and the year 2000. Explanations for these differences are provided in annex 4.2 of the NIR. In response to the ERT, the Netherlands indicated that there were some errors in the amount of carbon stored for crude oil and other oil in the period 1991–1995. The ERT recommends that the Netherlands resolve this problem and report thereon in its next annual submission, including any subsequent recalculations.

31. The ERT found that there are only small differences in apparent energy consumption between the reference approach and data reported to the IEA. Notable exceptions include stocks of liquid fuels and natural gas, and the breakdown between the different types of liquid and solid fossils for the period 1991–1994.

2. International bunker fuels

32. Emissions from international bunkers are calculated based on energy statistics provided by Statistics Netherlands. The ERT concluded that these emissions have been calculated in accordance with the IPCC good practice guidance and the Revised 1996 IPCC Guidelines.

3. Feedstocks and non-energy use of fuels

33. The ERT concluded that the reporting of feedstocks and non-energy use of fuels is in line with the Revised 1996 IPCC Guidelines and adjusted for country-specific circumstances. The methodology has been well described in the NIR. The ERT found that the completeness of the accounting of oxidation losses for chemical waste gas in the production of ethylene, methanol and carbon black identified by previous expert review remain unresolved, and the ERT recommends that the Party resolve this issue and report thereon in its next annual submission.

C. Key categories

Oil and natural gas: gaseous fuels – CO₂ and CH₄

34. The ERT concluded that the reporting of notation key ‘included elsewhere’ (IE) for exploration (1.B.2.b.i) could be improved by simplifying the explanation for the use of this notation key. Currently, the explanation refers to category 1.B.2.c.i which, in turn, refers to category 1.B.2.c.iii.

III. Industrial processes and solvent and other product use

A. Sector overview

35. In 2006, the industrial processes sector accounted for 7.5 per cent (15,659.65 Gg CO₂ eq) of total GHG emissions. Emissions from this sector increased by 0.7 per cent between 2005 and 2006, and decreased by 33.5 per cent between the base year and 2006. The key driver for the decrease in emissions over this period is the strong decrease in HFC-23 emissions from hydrochlorofluorocarbon-22 (HCFC-22) production. The chemical industry was the major category in 2006, contributing 65.4 per cent of total sector emissions. Metal production, consumption of halocarbons and SF₆, mineral products, other (2.G) and production of halocarbons and SF₆ contributed 12.0, 10.5, 7.5, 2.4 and 2.1 per cent, respectively, to total sector emissions. CO₂ is the dominant GHG, contributing 45.1 per cent to total sector emissions, while N₂O, HFCs, CH₄, PFCs and SF₆ contribute 40.0, 10.0, 1.9, 1.6 and 1.4 per cent, respectively. In 2006, the solvent and other product use sector accounted for 0.1 per cent (216.09 Gg CO₂ eq) of total GHG emissions. GHG emissions from this sector increased by 1.3 per cent between 2005 and 2006, and decreased by 60.1 per cent between the base year and 2006.

36. The ERT found the industrial processes inventory to be generally complete; however, the ERT identified a number of categories that are reported as NE that are known to occur in the country, namely, lime production, asphalt roofing, and road paving with asphalt. The Party stated that this is due to

missing AD. The ERT also found that potential emissions of F-gases have not been estimated by the Party.

37. The ERT found that the transparency of the inventory is inhibited by the use of the notation key 'confidential'. AD for most categories in the chemical industry, and the aggregation of F-gas emissions data in the consumption of halocarbons and SF₆ are reported as 'confidential'. This transparency issue is further compounded by the reporting of the incorrect notation key for categories whose data are aggregated; the Netherlands has reported notation key NO for HFC emissions from foam blowing and aerosols/metered dose inhalers, when notation key IE should be used. The ERT found it difficult to correlate activities covered by the national monitoring protocols⁸ with those in the CRF tables that are based on the IPCC nomenclature. The ERT encourages the Netherlands to consider providing in its next annual submission an explanation and/or mapping of activities captured by the aforementioned protocols with those of the IPCC nomenclature used in the CRF.

38. Additionally, the ERT found that the NIR and the national monitoring protocols contain information that has been superseded by more recent information reported in the CRF and are thus not consistent with corresponding information contained within the CRF tables. The ERT recommends that the Netherlands: assess the balance of information contained in the NIR and in the national monitoring protocols with a view to improving the transparency of the NIR; update the NIR to ensure that it is consistent with the CRF tables; investigate if further disaggregation of confidential data is possible to improve the transparency of the inventory; and review and revise the use of notation keys where appropriate.

39. The Netherlands has performed and reported recalculations in this sector in line with the IPCC good practice guidance. Recalculations were undertaken in response to recommendations of the previous expert review for the following categories: CO₂ emissions from glass production and N₂O emissions from caprolactum (for the period 1990–2002) have been recalculated in order to address the recommendations of the previous expert review. Indirect emissions of N₂O from the deposition of NO_x have been removed from the inventory.

40. The ERT found that the approach to estimate SF₆ emissions from electrical equipment has been revised to a country-specific method consistent to an IPCC tier 3 method. This new method has been applied from 2006 onward using data on annual input and output of SF₆. The ERT found that the Netherlands uses this new emissions data for 2006 and existing emissions data for 1999 to recalculate by interpolation the period 2000–2005. In response to the ERT regarding the transparency of the reporting of this recalculation, the Netherlands explained that 1999 emissions data are the basis of the emissions data for the period 1990–1998, correlated to economic development, and that the decrease in later years arises from better maintenance of electrical equipment. The ERT concluded that the recalculated time series is not sufficiently described in the NIR to allow for a review of its consistency. The ERT recommends that the Netherlands improve the documentation of recalculations, including justification of time series consistency, in the NIR for its next annual submission.

41. The ERT concluded that the Netherlands has applied general QA/QC procedures in compiling the industrial processes inventory.

42. Estimates of uncertainties are reported by the Party using the IPCC tier 1 approach, and are generally based on expert judgment. The Netherlands has reported the uncertainties of AD and EFs used in the calculations. The ERT found that the Netherlands has relied on emissions data reported by individual facilities for substantial parts of the inventory, and that no accurate information is available for assessing the uncertainty of the emissions data reported by these facilities.

⁸ Monitoring protocols include: 8102 and 8114–8126 <www.greenhousegases.nl>.

B. Key categories

1. Iron and steel production – CO₂

43. The ERT found that for steel, the implied EF is constant across the inventory time series except for the period 2000–2005, and that this EF is at the lower end of the spectrum when compared to that of other Parties. The NIR explains that the emission calculation considers the input of coal, coke and limestone as well as the carbon content in scrap steel, in line with the IPCC good practice guidance. However, the ERT concludes that this does not explain the constant implied EF. In response to the ERT, the Party explained that part of the process gases (coke oven gas and blast/oxygen furnace gas) were used as fuels, and emissions from the combustion of these gases were allocated to the energy sector. The ERT recommends that the Netherlands improve the documentation in the NIR on the methodology, calculations, allocation to other sectors and underlying assumptions for the emissions from this category.

2. Ammonia production – CO₂

44. Emission estimates are calculated from natural gas consumption and a country-specific EF. AD on the use of natural gas are obtained from Statistics Netherlands but are reported as ‘confidential’. The EF is based on a 17 per cent fraction of the carbon in the gas feedstock not being oxidized that is derived from a study⁹ covering 1993–1997 and based on the carbon contained in the urea product. The ERT recommends that the Netherlands review and update this fraction if the process conditions may have changed since 1997.

C. Non-key categories

1. Limestone and dolomite use – CO₂

45. The ERT recommends that the Netherlands improve the documentation on the other uses of limestone and dolomite besides flue gas cleaning. In response to the ERT, the Party explained that other uses include dolomite used in agriculture and limestone used in glass production. The ERT recommends that the Netherlands report dolomite used in agriculture in the LULUCF sector in line with the IPCC good practice guidance on LULUCF, and to confirm that there is no double counting of limestone used in glass production.

2. Soda ash production – CO₂

46. The ERT found that for the period 1996–1998, emissions from this category are reported as NO, even though AD exist for these years. In addition, the ERT established from the NIR that there is only one plant which uses the Solvay process. According to the Revised 1996 IPCC Guidelines, the stoichiometric industrial process emission of CO₂ from the Solvay process is zero, as the emitted CO₂ originates from coke oxidation. In response to the ERT, the Netherlands stated that it plans to check the time series and report thereon before its next annual submission.

3. Soda ash use – CO₂

47. The ERT noted from the national monitoring protocol 8114¹⁰ that soda ash used in glass production should be deducted from emissions reported from soda ash use, in order to prevent double counting with emissions from glass production. This monitoring protocol also states that this deduction

⁹ Neelis M., Patel M., de Feber M. 2003. Improvement of CO₂ emission estimates from the non-energy use of fossil fuels in the Netherlands. Report commissioned by the Netherlands’ agency for Energy and the Environment (NOVEM) and the Netherlands Ministry of Housing, Spatial Planning and the Environment (VROM). Utrecht University, Copernicus Institute/Dept. of Science, Technology and Society, Utrecht.

¹⁰ <www.greenhousegases.nl>.

has not occurred due to a lack of data, and that the quantity of CO₂ emission is small and has a high uncertainty. In addition, this monitoring protocol states that the average CO₂ EF for glass production, given as CO₂ per amount of glass produced, includes the use of limestone, dolomite and soda ash. The ERT acknowledges that uncertainties in emissions may be high, but recommends that the Netherlands resolve this double counting issue before its next annual submission.

IV. Agriculture

A. Sector overview

48. In 2006, the agriculture sector accounted for 8.8 per cent (18,183.47 Gg CO₂ eq) of total GHG emissions. Emissions from this sector decreased by 0.5 per cent between 2005 and 2006, and decreased by 17.7 per cent between the base year and 2006. The key drivers for the decrease in emissions between the base year and 2006 are the reduction in livestock population for dairy cattle, sheep and swine; a decrease in the nitrogen excretion rates; and the impact of a domestic manure and fertilizer policy that has resulted in a decline of synthetic fertilizer consumption. Agricultural soils was the major category in 2006, contributing 47.1 per cent to total sector emissions, while enteric fermentation and manure management contributed 34.7 and 18.2 per cent, respectively. N₂O is the dominant GHG, contributing 51.8 per cent to total sector emissions, while CH₄ contributes 48.2 per cent.

49. The ERT concluded that the agriculture inventory is generally complete across categories and GHGs. Rice cultivation, prescribed burning of savannas and field burning of agricultural residues are reported as NO. The ERT found that elements of the CRF tables have not been reported by the Party, namely additional information and parameters (e.g. gross energy intake, nitrogen excretion, etc.). The ERT reiterates the recommendation from the previous review regarding the reporting of additional information in the CRF tables and requests the Netherlands to resolve this problem and to report thereon in its next annual submission.

50. The ERT found that the transparency of the NIR has been improved when compared to the previous submission. The 2008 NIR contains a complete time series of aggregated AD for the main livestock categories, and trends in the implied EFs. The Netherlands has also provided explanations for the fluctuating trends. The referenced national monitoring protocols¹¹ have been updated; however, detailed AD are reported for the period 1990–2003. The ERT found that documentation on country-specific EFs are only in background papers. The ERT requested the Netherlands to provide all data underpinning calculations for the period 2004–2006 (e.g. methane correction factor, distribution of animal waste management systems, volatile solids excretion, methane producing potential, etc.). In response to the ERT, the Netherlands explained that all of the parameters will be included in a background report¹² that was not available for this expert review. The ERT reiterates the recommendation from the previous review regarding the provision of information in the NIR to improve the transparency of AD, EFs, parameters and methods used to estimate emissions, and requests the Netherlands to resolve this problem and to report thereon in its next annual submission.

51. The ERT concluded that the correction made to the CRF table to resolve the problem of rounding AD has been implemented in accordance with the recommendation of the previous expert review, and that the calculation of N₂O emissions from manure management are no longer adjusted for ammonia (NH₃) emissions.

¹¹ Monitoring protocols 8127–8132 <www.greenhousegases.nl>.

¹² Van Schijndel, M.W. and Van der Sluis, S.M. .2008. Methane and nitrous oxide emissions from agriculture, 1990–2006. Background document for the Dutch National Inventory Report 2008.

B. Key categories

1. Enteric fermentation – CH₄

52. The ERT found that the methodology used to estimate dairy cattle EFs, as described in the national monitoring protocols 8127 and 8128, and the results of the simulation model, are not provided in the NIR. The ERT recommends that the Netherlands improve the documentation of its methodology, including underlying data, in its next annual submission.

2. Manure management – CH₄

53. The ERT found that the manure production per animal for all categories of poultry (except broilers and turkeys) decreased during the period 1990–2003. In response to the ERT, the Netherlands explained that the decline after 2002 can be attributed to an update of information on manure production factors, and to revised information on the animal housing system after 2003. The ERT concluded that the increase in the use of drying manure systems has led to a corresponding decrease in the total volume of poultry manure. The ERT recommends that the Netherlands provide specific information on underlying data and trends, and recalculations to ensure time-series consistency resulting from any revisions of AD, EFs or other parameters (e.g. manure production factors) in its next annual submission.

3. Manure management – N₂O

54. The ERT concluded that the methodology used to derive annual nitrogen excretion rates is not sufficiently described in the NIR, the national monitoring protocol 8129 or the background papers, nor is this reported in the CRF tables. In response to the ERT, the Netherlands explained that the nitrogen excretion rates are estimated from the energy requirement calculation combined with national statistics on the feed intake. The ERT recommends that the Netherlands improve the transparency of this methodology in the NIR for its next annual submission.

4. Direct soil emissions – N₂O

55. The ERT found that the Netherlands has not included in its emissions calculation the quantity of manure that is exported outside of the country to Germany and Belgium. The ERT conclude that this is in line with the Revised 1996 IPCC guidelines, even though the ERT noted that the IPCC good practice guidance does not explicitly address the issue of import and export of manure. The Netherlands in response to the ERT stated that its approach is in line with the IPCC good practice guidance. The ERT recommends that the Netherlands provide improved documentation in support of enhancing understanding of the approach used in its next annual submission.

C. Non-key categories

Pasture, range and paddock manure – N₂O

56. The ERT found that the amount of manure has been corrected for NH₃ volatilization and concluded that this is not in line with the Revised 1996 IPCC guidelines. In response to the ERT, the Netherlands explained that it used country-specific EFs, which includes a correction for NH₃ emissions, and also provided a reference for this information¹³. The ERT recommends that the Netherlands improve the transparency of this calculation by providing all relevant explanations from the background paper in the NIR.

¹³ <<http://library.wur.nl/wda/dissertations/dis3456.pdf>>.

V. Land use, land-use change and forestry

A. Sector overview

57. In 2006, emissions from LULUCF sector in the Netherlands amounted to a net source of 2,574.36 Gg CO₂ eq. The net source decreased by 0.3 per cent between 2005 and 2006, and decreased by 3.5 per cent between the base year and 2006.

58. The ERT found that the Netherlands has not revised the LULUCF time series in response to recommendations from the previous expert review. The ERT is cognizant of the complexity of the recommendations and the limited time available between the 2007 resubmission and the 2008 submission to undertake these revisions. However, the ERT noted that the NIR states that the required improvements will be implemented in the next annual submission. The ERT also appreciated receiving a progress update during the review. The ERT reiterates the recommendation from the previous expert review, especially regarding the need to improve the estimates of areas of land use and areas of land-use change and the estimates of carbon emissions from soil in land-use changes, and requests the Netherlands to resolve these problems and to report thereon in its next annual submission.

59. The ERT concluded that the reporting of land area is not consistent over time (the sum of AD for all land uses increases with time) and that the percentage of land use cover is inconsistent between the NIR and the CRF. In response to the ERT, the Netherlands explained that the improvement of the land use matrix will be given prominence and will be resolved in its next annual submission.

60. The ERT found that the reporting of emissions from deforestation is not consistent across CRF tables. For example, for the year 2006, 487.55 Gg CO₂ eq. are reported for the information item 'forest land converted to other land-use categories' and 531.51 Gg CO₂ eq. are reported for 'forest land converted to grassland'. During the review, the Netherlands explained that the former value excludes emissions from deforestation of 'trees outside forest', while the latter value includes deforestation of 'trees outside forest'. The ERT noted that the Netherlands has defined 'trees outside forest' in its forest land category, and therefore recommends that the Party revise the reported emissions in CRF table 5.

61. The ERT found that the use of notation key IE is not always explained with respect to where the emissions by source or removals by sink are included. The ERT recommends that the Netherlands provide the explanation in its next annual submission.

62. The ERT concluded that there is an inconsistency in the reporting of the uncertainty for CO₂ emission estimates in the NIR (i.e. 100 per cent on page 47, and between 25 and 67 per cent on page 247). In response to the ERT, the Netherlands explained that improved QA/QC procedures will be used in its 2009 submission.

63. The ERT noted that the uncertainty of AD for deforestation is reported to be 25 per cent, whereas the result of the verification of deforestation would suggest that the uncertainty is much higher (i.e. between 40 and 70 per cent (page 185 of the NIR)). In response to the ERT, the Netherlands explained that the uncertainty value of 25 per cent is derived from the multiplication of the uncertainties from two topographic maps. However, the ERT recommends that the Netherlands consider the result of the aforementioned verification of deforestation in its next uncertainty analysis.

B. Key categories

Forest land remaining forest land – CO₂

64. The ERT noted that heather is reported as a subdivision of the forest land category. In response to the ERT, the Netherlands explained that the reporting of heather is still included in forest land. Heather is a shrub and, as such, does not meet the forest definition. The ERT reiterates the recommendation from the previous expert review regarding the reporting of heather as a subdivision of

forest land, and requests the Netherlands to resolve this problem and report thereon in its next annual submission.

C. Non-key categories

Forest converted to other lands – CO₂

65. The ERT found that under ‘forest converted to other lands’, the notation key IE is used for both AD and EF, but that an emission of 115.98 Gg CO₂ eq. is reported for the soil pool. In response to the ERT, the Netherlands explained that all forest land converted to any other kind of land use is reported under ‘forest land converted to grassland’. The ERT reiterates the recommendation of the previous expert review that the Netherlands report all emissions from deforestation in a consistent and transparent way, and that it report thereon in its next annual submission. The ERT suggests that the Party report the net carbon stock change in soils under grassland; thus the total emissions from conversion of forest to grassland would be 647.48 Gg CO₂ eq. (531.51 Gg plus 115.98 Gg). The same value should also be reported in the deforestation information item in CRF table 5.

VI. Waste

A. Sector overview

66. In 2006, the waste sector accounted for 3.1 per cent (6,332.04 Gg CO₂ eq) of total GHG emissions. Emissions from the sector decreased by 6.4 per cent between 2005 and 2006, and by 50.6 per cent between the base year and 2006. The key driver for the decrease in emissions between the base year and 2006 is the amount of solid waste disposed on land. Solid waste disposal on land is the major category in the waste sector, contributing 89.2 per cent to total sector emissions; emissions from wastewater handling contribute 9.2 per cent. Emissions from waste incineration are reported under energy industries. CH₄ is the main GHG, contributing 93.4 per cent to total sector emissions, whereas N₂O contributes 6.6 per cent.

67. The waste inventory is generally complete in terms of categories and gases; N₂O emissions from industrial wastewater are reported as NE.

68. The ERT encourages the Netherlands to further improve the transparency of the inventory by: including flow charts/diagrams that provide mass balances of solid waste and wastewater in the overview section of the NIR; including all AD and EFs used to estimate emissions from the solid waste disposal category in a single document or website; documenting, in accordance with the recommendation from the previous expert review, the fraction of degradable organic carbon and its composition to clarify that it does not include construction and demolition waste; and providing improved documentation on the CH₄ and N₂O EFs in the NIR to estimate emissions from wastewater handling.

69. The ERT noted that recommendations of the previous expert review have not been fully addressed by the Party; namely, the value of the oxidation factor and the fraction of CH₄ in landfill gas reported in the CRF table 6A are still different from those reported in the NIR. The ERT recommends that the Netherlands ensure the consistent reporting of these values in its next annual submission.

B. Key categories

Solid waste disposal on land – CH₄

70. Emissions from this category were estimated with the use of a model derived from the first-order decay (FOD) model and adjusted using country-specific parameters. The IPCC default values were used for the methane correction factor, while the normalization factor was not (but was considered as compensated based on a validation study as explained to the previous ERT). However, this ERT could not verify the considerations of the abovementioned validation study as it was not sufficiently

documented in the NIR. Whilst acknowledging the findings of the previous ERT on this issue, the ERT recommends that the Netherlands significantly improve documentation in the NIR by providing explanations and justification of the assumptions made and any country-specific tailoring of this model. In addition, the ERT recommends that the Netherlands explore how to use the country-specific normalization factor according to the actual methane rate constant (k) value in its next annual submission as a means to improve the comparability of the emissions estimate.

71. The k value is assumed to be 0.094 until 1990, and to decrease thereafter to 0.06. The national monitoring protocol 8135 states that the 0.094 value is based on a model validation study undertaken in the 1990s. The Netherlands explained the reasoning for this in the previous expert review, namely, that the change after 1990 arose as a result of recycling policies and that the change in the k value was based on expert judgment. The ERT recommends that the Party provide an additional explanation of this decrease in k value in its next annual submission.

C. Non-key categories

Wastewater handling – N₂O

72. The ERT recommends that the Netherlands correct data on the quantity of wastewater treated and nitrogen in the effluent. In response to the ERT, the Netherlands provided the ERT with correct data.

VII. Other issues

1. Changes to the national system

73. The Netherlands has not reported on any changes to its national system in the 2008 submission (Annex 11 of its NIR). In response to the ERT, the Party confirmed that no changes to the national system have taken place.

2. Changes to the national registry

74. The Netherlands has not reported on any changes to its national registry in the 2008 submission. In response to the ERT, the Party confirmed that no changes to the national registry have taken place.

3. Commitment period reserve

75. The Netherlands has not reported its commitment period reserve in the 2008 submission. In response to the ERT, the Party reported that its commitment period reserve (901,135,927 t CO₂ eq) has not changed since the initial report review.

VIII. Conclusions and recommendations

76. The inventory submitted by the Netherlands generally covers all sectors and most categories, and is complete in terms of years, gases and geographical coverage. The Netherlands has submitted a NIR based on the structure set out in the UNFCCC reporting guidelines, and submitted CRF tables for all years of the inventory time series. The ERT concluded that the completeness of the inventory could be improved with the reporting of emission estimates for activities that are known to occur in the Netherlands.

77. The inventory is generally prepared in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT identified instances of potential underestimations (relating to the aforementioned conclusion regarding the completeness of the inventory).

78. The key recommendations are that the Netherlands:
- (a) Improve the consistency of information reported in the NIR with information provided in the national monitoring protocols, update this information and provide a way for the ERT to reproduce the inventory;
 - (b) Further improve the transparency of the inventory with a specific focus on the reporting of confidential emissions, AD, EFs and methodology;
 - (c) Improve the completeness of the inventory by reporting emissions for categories currently reported as NE in the energy, industrial processes, LULUCF and waste sectors;
 - (d) Further improve the description of category-specific QA/QC activities in the NIR to cover at least all key categories;
 - (e) Expand QC procedures to identify potential inconsistencies in the reporting;
 - (f) Improve the reporting of the key category analysis in the NIR by clearly differentiating the output of this analysis with and without LULUCF;
 - (g) Further centralize the archiving system;
 - (h) Address recommendations from the previous expert review in regards to the LULUCF time series and the land-use change matrix;
 - (i) Report emissions from deforestation in the CRF tables in a consistent way.

IX. Questions of implementation

79. No questions of implementation were identified by the ERT during the review.

Annex**Documents and information used during the review****A. Reference documents**

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gp/english/>>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gp/landuse/gp/landuse.htm>>.

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”. FCCC/SBSTA/2006/9. Available at <<http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>>.

“Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention”. FCCC/CP/2002/8. Available at <<http://unfccc.int/resource/docs/cop8/08.pdf>>.

“Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol”. Decision 19/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>>.

“Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol”. Decision 15/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>>.

“Guidelines for review under Article 8 of the Kyoto Protocol”. Decision 22/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>>.

Status report for the Netherlands 2007. Available at <<http://unfccc.int/resource/docs/2007/asr/nld.pdf>>.

Status report for the Netherlands 2008. Available at <<http://unfccc.int/resource/docs/2008/asr/nld.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2007. Available at <<http://unfccc.int/resource/webdocs/sai/2007.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2008. Available at <<http://unfccc.int/resource/webdocs/sai/2008.pdf>>.

FCCC/ARR/2006/NLD. Report of the individual review of the greenhouse gas inventory of the Netherlands submitted in 2006. Available at <<http://unfccc.int/resource/docs/2007/arr/nld.pdf>>.

FCCC/IRR/2007/NLD. Report of the review of the initial report of the Netherlands. Available at <<http://unfccc.int/resource/docs/2007/irr/nld.pdf>>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Vreuls (SenterNovem). The following documents were also provided by the Netherlands:

Neelis M., Patel M., de Feber M. 2003. Improvement of CO₂ emission estimates from the non-energy use of fossil fuels in the Netherlands, report commissioned by the Netherlands' agency for Energy and the Environment (NOVEM) and the Netherlands' Ministry of Housing, Spatial Planning and the Environment (VROM). Utrecht University, Copernicus Institute/Dept. of Science, Technology and Society, Utrecht.

Zeeman Grietje and Gerbens Sybren. 2002. 'Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories. CH₄ emissions from animal manure'. Wageningen University, the Netherlands. P. 339–348. (Background paper).

Zeeman G. 1994. Methane production/emission in storages for animal manure. *Fertilizer Research* 37(1): 207–211.
